

WHAT IS CLAIMED IS:

1. An image processing apparatus comprising:

depth map extracting means for extracting a depth map, which represents a depthwise distribution of an object, from a stereo image containing object images looking from multiple viewpoints and formed in the same image plane;

multi-viewpoint image sequence generating means for generating a multi-viewpoint image sequence of said object looking from the multiple viewpoints based on said stereo image and said depth map; and

three-dimensional image synthesizing means for synthesizing a three-dimensional image based on said multi-viewpoint image sequence.

2. An image processing apparatus according to Claim 1, wherein said three-dimensional image synthesizing means synthesizes the three-dimensional image such that pixels of respective images of said multi-viewpoint image sequence, which have the same coordinates, are arranged as adjacent pixels in accordance with a viewpoint array of the images.

3. An image processing apparatus according to Claim 2, wherein the respective images of said multi-viewpoint image sequence are generated by a process of modifying one

viewpoint image among the object images, which constitute said stereo image, using said depth map.

4. An image processing apparatus according to Claim 3, wherein said multi-viewpoint image sequence of said object is generated using viewpoints which are arranged spatially at equal intervals and in symmetrical relation about a viewpoint of the image subjected to the modifying process.

5. An image processing apparatus according to Claim 4, wherein said stereo image is supplied as digital image data via a network from image recording means for recording said stereo image as the digital image data.

6. A stereophotographic printing system comprising:

a camera for photographing an object image;

a stereophotographic adapter mounted to said camera for photographing object images looking from multiple viewpoints, as a stereo image, in the same photographed image plane of said camera;

an image processing apparatus for extracting a depth map, which represents a depthwise distribution of an object, from said stereo image, generating a multi-viewpoint image sequence of said object looking from the multiple viewpoints based on said stereo image and said depth map, and

synthesizing a three-dimensional image based on said multi-viewpoint image sequence; and

a printer for printing the three-dimensional image for enabling a stereoscopic image of said object to be observed with an optical member.

7. A stereophotographic printing system according to Claim 6, wherein said image processing apparatus synthesizes the three-dimensional image such that pixels of respective images of said multi-viewpoint image sequence, which have the same coordinates, are arranged as adjacent pixels in accordance with a viewpoint array of the images.

8. A stereophotographic printing system according to Claim 7, wherein the respective images of said multi-viewpoint image sequence are generated by a process of modifying one viewpoint image among the object images, which constitute said stereo image, using said depth map.

9. A stereophotographic printing system according to Claim 8, wherein said multi-viewpoint image sequence of said object is generated using viewpoints which are arranged spatially at equal intervals and in symmetrical relation about a viewpoint of the image subjected to the modifying process.

10. A stereophotographic printing system according to Claim 6, further comprising an image recording device for recording said stereo image as digital image data, wherein said image recording device outputs said digital image data to said image processing apparatus via a network.

11. A stereophotographic printing system according to Claim 10, wherein said optical member is constituted by a lenticular sheet having a cyclic structure, and enables a stereoscopic image of said object to be observed when said optical member is laid on a print surface of the three-dimensional image printed by said printer.

12. An image processing method comprising the steps of:

a depth map extracting step of extracting a depth map, which represents a depthwise distribution of an object, from a stereo image containing object images looking from multiple viewpoints and formed in the same image plane;

a multi-viewpoint image sequence generating step of generating a multi-viewpoint image sequence of said object looking from the multiple viewpoints based on said stereo image and said depth map; and

a three-dimensional image synthesizing step of

synthesizing a three-dimensional image based on said multi-viewpoint image sequence.

13. An image processing method according to Claim 12, wherein said three-dimensional image synthesizing step synthesizes the three-dimensional image such that pixels of respective images of said multi-viewpoint image sequence, which have the same coordinates, are arranged as adjacent pixels in accordance with a viewpoint array of the images.

14. An image processing method according to Claim 13, wherein the respective images of said multi-viewpoint image sequence are generated by a process of modifying one viewpoint image among the object images, which constitute said stereo image, using said depth map.

15. An image processing method according to Claim 14, wherein said multi-viewpoint image sequence of said object is generated using viewpoints which are arranged spatially at equal intervals and in symmetrical relation about a viewpoint of the image subjected to the modifying process.

16. An image processing method according to Claim 12, wherein said stereo image is supplied as digital image data via a network from a image recording device for recording

said stereo image as the digital image data.

17. A stereophotographic printing method comprising the steps of:

a depth map extracting step of extracting a depth map, which represents a depthwise distribution of an object, from a stereo image generated by using a camera for photographing an object image and a stereophotographic adapter mounted to said camera for photographing object images looking from multiple viewpoints, as said stereo image, in the same photographed image plane of said camera;

a multi-viewpoint image sequence generating step of generating a multi-viewpoint image sequence of said object looking from the multiple viewpoints based on said stereo image and said depth map;

a three-dimensional image synthesizing step of synthesizing a three-dimensional image based on said multi-viewpoint image sequence; and

a printing step of printing the three-dimensional image for enabling a stereoscopic image of said object to be observed with an optical member.

18. A stereophotographic printing method according to Claim 17, wherein said three-dimensional image synthesizing step synthesizes the three-dimensional image such that

pixels of respective images of said multi-viewpoint image sequence, which have the same coordinates, are arranged as adjacent pixels in accordance with a viewpoint array of the images.

19. A stereophotographic printing method according to Claim 18, wherein the respective images of said multi-viewpoint image sequence are generated by a process of modifying one viewpoint image among the object images, which constitute said stereo image, using said depth map.

20. A stereophotographic printing method according to Claim 19, wherein said multi-viewpoint image sequence of said object is generated using viewpoints which are arranged spatially at equal intervals and in symmetrical relation about a viewpoint of the image subjected to the modifying process.

21. A stereophotographic printing method according to Claim 20, wherein said stereo image is supplied as digital image data via a network from a image recording device for recording said stereo image as the digital image data.

22. A stereophotographic printing method according to Claim 17, wherein a stereoscopic image of said object can be

observed by placing said optical member on a print surface of the three-dimensional image printed by said printing step.

23. A storage medium product storing a processing program comprising the steps of:

a depth map extracting step of extracting a depth map, which represents a depthwise distribution of an object, from a stereo image containing object images looking from multiple viewpoints and formed in the same image plane;

a multi-viewpoint image sequence generating step of generating a multi-viewpoint image sequence of said object looking from the multiple viewpoints based on said stereo image and said depth map; and

a three-dimensional image synthesizing step of synthesizing a three-dimensional image based on said multi-viewpoint image sequence.

24. A storage medium product according to Claim 23, wherein said three-dimensional image synthesizing step synthesizes the three-dimensional image such that pixels of respective images of said multi-viewpoint image sequence, which have the same coordinates, are arranged as adjacent pixels in accordance with a viewpoint array of the images.

25. A storage medium product according to Claim 24,



26. An image processing method according to Claim 25, wherein said multi-viewpoint image sequence of said object is generated using viewpoints which are arranged spatially at equal intervals and in symmetrical relation about a viewpoint of the image subjected to the modifying process.